

## **ROYAL TERN (*Sterna maxima*)**

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### **Criteria Scores**

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
0	0	10	10	0	10	15

### **Special Concern Priority**

Currently considered a Bird Species of Special Concern (breeding), Third Priority. Not included on CDFG's (1992) unprioritized list or on Remsen's (1978) original prioritized list.

### **Breeding Bird Survey Statistics for California**

Data inadequate for trend assessment (Sauer et al. 2000).

### **General Range and Abundance**

Comprised of two subspecies worldwide. *S. m. albididorsalis* of the Old World occurs on the west coast of Africa from the Straits of Gibraltar to Benguella (Peters 1934). In the New World the nominate *S. m. maximus* breeds along Pacific coast from southern California south to Baja California (Ojo de Liebre and San Ignacio lagoons, Massey and Palacios 1994); in the northern Gulf of California, on Isla Montague (Palacios and Mellink 1993) where it breeds occasionally (E. Mellink pers. comm), south to Isla Raza (Everett and Anderson 1991) and the Tres Marias Islands off Nayarit (AOU 1957, 1998). Although the species has been reported to have bred in Sonora and Sinaloa (AOU 1998), there has been no confirmation of nesting away from Georges I (= Isla San Jorge, van Rossem 1945); the species no longer breeds at this location (Mellink and Palacios 1993) or elsewhere in Sonora (Russell and Monson 1998), but is currently reported to nest in Bahia Santa Maria in n. Sinaloa (Xico Vega, in litt.). In the Gulf-Caribbean-Atlantic region the Royal Tern breeds from s. Texas to s. Louisiana south through the West Indies and to islands off the north coast of Venezuela and French Guiana, and in Yucatan; along the Atlantic coast from Maryland to

Georgia, and on the northern coast of Argentina (AOU 1998). Winters from central California south to Peru; from the Caribbean area and S. Carolina south to Colombia and Argentina (AOU 1957). No information on the size of entire North American population. The population breeding on Isla Raza, the largest colony in the Gulf of California, was estimated to contain 8,000 to 10,000 pairs (Everett and Anderson 1991). At the few known nesting locations in Mexico (three in Baja California, one in Sinaloa), the colonies are much smaller, ranging from 300 to 500 pairs (Massey and Palacios 1994, Xico Vega, in litt.).

### **Seasonal Status in California**

Occurs primarily in two seasonal roles: (1) as a non-breeding visitor on the southern and central coast and offshore islands from September to April (with largest numbers from November through mid-February) and, (2) a spring and summer breeding visitor restricted to the southern coast. Breeding birds arrive in April and colony attendance peaks from late April through July. Non-breeding birds may be found throughout the year around the Channel Islands (Garrett and Dunn 1981); small numbers of non-breeders can be found along the southern California coast through the summer well away from nesting areas (Garrett and Dunn 1981, Marantz 1986).

### **Historical Range and Abundance in California**

Grinnell and Miller (1944) described the Royal Tern as a non-breeding visitor “variable in times of appearance and relative numbers”, but most abundant from September to March, and becoming less regular after about 1912 “at least north of the San Diegan district”. The range of the Royal Tern extended along the coast from San Diego north to San Francisco Bay, although recorded from as far north as Tomales Bay, Marin Co. (Grinnell and Miller 1944). They were found around all of the Channel Islands.

### **Recent Range and Abundance in California**

Over the last 50 years changes in the Royal Tern’s status and range in the state have become apparent. Probably most significant is that the northern boundary of its breeding range expanded

northward into coastal southern California with small numbers now breeding at south San Diego Bay, San Diego Co., Bolsa Chica, Orange Co., and occasionally at the Port of Los Angeles, Los Angeles Co. One pair colonized the Western Saltworks in south San Diego Bay in 1959 (Gallup and Bailey 1960). Confusion had surrounded the early reports of Royal Tern nesting attempts (see Unitt 1984), however, Schaffner (1985) has since confirmed the initial claim by Gallup and Bailey. Since 1959, one to two pairs of Royal Terns have occasionally bred at the saltworks; reports in American Birds indicate that the period of most regular breeding occurred in the early 1980s, however the species appears to have become more numerous most recently with a peak number of 30 breeding pairs reported for the saltworks in 1999 (Patton 1999). In 1988 three pairs colonized the estuary at the Bolsa Chica Ecological Reserve. Breeding at this location was more regular than at San Diego with up to 20 pairs in 1997 (FN 51:1054). In 1998, the species colonized the Port of Los Angeles with 17 pairs (FN 52:503); up to 15 pairs bred at this location in 2000 (NAB 54: 423). At present the small and variable California breeding population probably consists of 20-40 pairs.

In contrast to the extension of its breeding range into California, the species has exhibited a concurrent contraction of its range as a winter visitor. Whereas the species formerly ranged northward to the San Francisco Bay area (exceptionally to Tomales Bay, Marin Co.), it is now rare north of San Luis Obispo Co. (Garrett and Dunn 1981, Roberson 1985, Small 1994). The abundance and distribution of the Royal Tern appears to be associated with that of the Pacific Sardine (*Sardinops sagax*) and other inshore fish populations (Schaffner 1985) such that the tern's contraction in winter range may have been reflected in part by the collapse in the 1950s of the commercial sardine fishery centered off Monterey. The Royal Tern continues to be fairly common offshore around the Channel Islands (Garrett and Dunn 1981, Small 1994). It was unknown away from the immediate coast until 1990 when it was reported from the north end of the Salton Sea, Riverside Co (Small 1994). Patten et al. (2002) report at least five records of the species inland, all from the Salton Sea from mid-May to mid-July.

## Ecological Requirements

The ecological requirements of Royal Terns have rarely been studied and published descriptions of their nesting biology and general habitat use mostly pertain to breeding populations on the east coast of North America. Because Pacific coast breeding populations of Royal Terns are closely associated with Elegant Terns, information on the former species is often derived from accounts of the Elegant Tern. The nesting habitat is generally open and bare, with little or no vegetation. In the Gulf of California, Royal Terns nest on low, sparsely vegetated islands of volcanic rock with a pebble substrate (Burness et al. 1999), or among dry silty mudflats with substrate composed of shell fragments (Palacios and Mellink 1993). In California, colonies establish on isolated and bare earthen dikes surrounding evaporation ponds (Schaffner 1985), and on dredged sand islands containing minimal vegetation, in estuaries and harbors (Collins et al. 1991, Burness et al. 1999). The general characterization of nesting habitat that emerges for Pacific coast populations agrees well with that given by Buckley and Buckley (1972) for the Atlantic coast colonies of Virginia and North Carolina, where the terns appear to prefer isolated spoil banks that lack access to quadruped predators and provide excellent visibility of the surrounding area. As for Atlantic populations, colony locations in southern California are often adjacent to an inlet between bay and ocean and near extensive shallow areas for feeding.

Like the Elegant Tern, nest and colony defense of this species may be less developed than in other larids (Buckley and Buckley 1972), and colony establishment may therefore require the presence of nesting aggregations of other more aggressive larids such as Caspian and Gull-billed terns, Black Skimmers, or as on Isla Raza, Heermann's Gulls (Burness et al. 1999). Substrates for nesting need to be of sufficient size to accommodate large colonies of Elegant Terns, the nesting species that Royals are most closely associated with in California. At Atlantic coast colonies, Royal Terns are closely associated with the Laughing Gull (*Larus atricilla*; Buckley and Buckley 1972). This also appears to be the case at the breeding location in northern Sinaloa (Xico Vega, in litt.).

Studies of diet on the breeding grounds on the Atlantic coast indicate that fish are a major component but offspring are often fed small soft-shelled crabs (Buckley and Buckley 1972). Other components of the diet for Atlantic coast populations include squid (*Loligo*), and shrimp (probably *Crangon*). Royal Terns forage mostly inshore, in shallow waters usually at or near the surf line. They regularly penetrate 20-30 km up tidal rivers emptying into Chesapeake Bay. Foraging birds can range up to 40 km away from breeding colonies in the east.

Although no quantitative information has been published on the diet of Royal Terns in southern California, the species appeared to predominantly feed on members of Atherinidae, specifically, the Topsmelt (*Atherinops affinis*, Schaffner (1985); this in contrast to the heavy reliance by the Elegant Tern on the Northern Anchovy (*Engraulis mordax*, Schaffner 1986). Royals tend to forage inshore along bays and estuaries; they are rarely observed at the upper ends of non-tidal lagoons (Unitt 1984). Observations of this species well out to sea suggest that they may also forage beyond the outermost Channel Islands (K. Garrett pers obs.). Except for the description of the extended parental feeding behavior observed away from nesting colonies (Ashmole and Tovar 1968), there is no information on diet or foraging behavior from the winter grounds on the Pacific coast. There is no information published on habitat quality in important wintering areas.

## **Threats**

During the breeding season, Royal Terns are limited to only 2 or 3 colony sites concentrated along the immediate coast of densely populated southern California. The breeding colonies at San Diego Bay and Bolsa Chica fall under the jurisdiction of federal and state wildlife agencies but that at the Port of Los Angeles does not; the number, size and integrity of nesting and foraging habitats are potentially threatened by continuing urban and commercial development around these sites (Burness et al. 1999). Because of their low tolerance to disturbances, and high susceptibility to terrestrial predators (Buckley and Buckley 1972), the proximity of Royal Tern nesting habitats to populations of feral and domestic predators accompanying areas of dense human population,

particularly apparent at south San Diego Bay, threaten colony reproductive success. Because Royal Tern offspring join the dense “nursery” flocks or crèches formed by Elegant Tern chicks, they are particularly susceptible to colony intrusion by wild and domestic canids. Repeated disturbance to breeding colonies as a result of human intrusion can potentially reduce seabird productivity and colony site fidelity (Anderson and Keith 1980). All California breeding colonies are on man-made substrates, and therefore require continued funding to satisfactorily manage and maintain them as productive nesting sites.

Catastrophic oil spills and continued inputs of urban pollution and industrial wastes may degrade important foraging areas. Because their diet consists of a variety of inshore fish species, the Northern Anchovy among them, Royal Tern populations may directly compete with commercial harvests of such bait fisheries. As with Elegants (Schaffner 1986), Royal Terns may also be susceptible to changes in the local abundance patterns of these prey species.

Contamination by pesticides and other toxic compounds have not been investigated for the Royal Tern, however, they are not believed to be important factors in reproductive success, nor an important source of mortality for their congeners in southern California colonies (Burness et al. 1999).

### **Management and Research Recommendations**

- Maintain and enhance isolation of nesting colonies, particularly those in San Diego Bay by eliminating connections to main perimeter levee. Provide additional nesting sites where feasible. At all California colony sites, Royal Terns derive de-facto protections because of their proximity to breeding colonies of Endangered California Least Terns.
- Secure long-term protection of a nesting colony site in the Port of Los Angeles.
- Identify and census additional nesting sites in Mexico to accurately estimate the Pacific coast breeding population.

- Conduct demographic studies addressing population dynamics and structure, fecundity and survival.
- Protect water quality in highly vulnerable areas such as bays and estuaries that provide essential inshore feeding habitats.

### **Monitoring Needs**

Because it occupies just a few nesting sites, has special nesting requirements, and is closely associated with the Elegant Tern, the California population of the Royal Tern should be monitored on an annual basis. More widespread surveys to include locations in Mexico where the species bred previously should be performed at 3 to 5 year intervals.

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